

AD-A078 609

ARMY INST OF DENTAL RESEARCH WASHINGTON D C
EVALUATION AND PATIENT ACCEPTANCE OF A MECHANICAL DENTAL FLOSSI--ETC(U)
OCT 79 R F BARTON, B DIAMOND

F/G 6/5

UNCLASSIFIED

NL

| OF |

AD
A078609



END
DATE
FILMED
1-80
DDC

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS
BEFORE COMPLETING FORM

1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Evaluation and Patient Acceptance of a Mechanical Dental Flossing Device as Compared to Hand-Held Floss.		5. TYPE OF REPORT & PERIOD COVERED Submission of paper. 1977-1979
7. AUTHOR(s) Ronald F. Barton, Jr. and Barbara Diamond		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Army Institute of Dental Research Walter Reed Army Medical Center Washington, DC 20012		8. CONTRACT OR GRANT NUMBER(s) Rept. for 1977-1979
11. CONTROLLING OFFICE NAME AND ADDRESS U. S. Army Medical Research & Development Command HQDA (SGRD-RP) Fort Detrick, MD 21701		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 61101A 3A161101A9TC/00 354
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE October 1979
		13. NUMBER OF PAGES 15
		15. SECURITY CLASS. (of this report) UNCLASSIFIED
16. DISTRIBUTION STATEMENT (of this Report) This document has been approved for public release and sale; its distribution is unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report) None		
18. SUPPLEMENTARY NOTES None		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Hand-held dental floss; mechanically held dental floss; dental plaque; cleansing efficacy.		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This study had two objectives. First - to ascertain the relative cleansing efficacy of a mechanical floss-holding device and an hand-held waxed dental floss and secondly, to determine the patient acceptance of each of these methods of using dental floss. It was illustrated that floss held by a mechanical device was as effective as regular hand-held floss in reducing gingival bleeding. Also, patients that expressed a preference preferred the mechanical flossing device by a ratio of four to three.		

DD FORM 1473 1 JAN 73 EDITION OF 1 NOV 65 IS OBSOLETE

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

ADA 078609

DDC FILE COPY

DDC
RECEIVED
DEC 26 1979
RECEIVED
E

038 670

JOC

EVALUATION AND PATIENT ACCEPTANCE OF A
MECHANICAL DENTAL FLOSSING DEVICE AS COMPARED
TO HAND-HELD FLOSS

Authors: Ronald F. Barton, Jr. DDS, MPH
Barbara Diamond, RDH

Affiliations: Ronald F. Barton, Jr., currently assigned as
Chief of Clinical Operations, United States
Army Institute of Dental Research, Washington, D. C.
Barbara Diamond, Dental Hygienist, Fort Benning
Dental Activity, Fort Benning, Georgia.

Author to Receive
Reprint Requests
and Correspondence: Colonel Ronald F. Barton, Jr.

Address to use for
Reprint Requests
and Correspondence: Colonel Ronald F. Barton, Jr.
Chief, Division of Clinical Operations
USAIDR, WRAMC
Washington, D.C. 20012

Location: This research project was accomplished at Fort
Benning, Georgia/ Giessen, Germany/ and at the
U.S. Army Institute of Dental Research in
Washington, D. C.

Supported: This study was supported by the U.S. Army
Institute of Dental Research as an outbound
project.

Presentation:

An abstract of this paper has been submitted to
the American Association of Dental Research (AADR)
for presentation at the 20-23 March 1980 meeting.
(If this paper is accepted for publication in the
Clinical Preventive Dentistry Journal, please make
it after the 20-23 March 1980 meeting. The AADR
requires presentations not to have been published
prior to their meeting).

Accession For	
NTIS GPO&I	<input checked="" type="checkbox"/>
DDC TAB	<input type="checkbox"/>
Unannounced Justification	<input type="checkbox"/>
By _____	
Distribution/ _____	
Availability _____	
First	Available/for special
A	

79 12 17 160

Introduction and Specific Aim

Many articles in the dental literature deal with the use of dental floss to clean interproximal tooth surfaces. Bass and Arnim^{2,1} were leaders in recommending the use of floss as an effective oral health cleaning aid but Parmly¹¹ preceded them when he wrote..."The third part is the waxed silken thread, which, though simple, is the most important. It is to be passed through the interstices of the teeth, between their necks and the arches of the gums, to dislodge that irritative matter which no brush can remove, and which is the real source of disease. With this apparatus thus regularly and daily used, the teeth and gums will be preserved free from disease." This was written in 1819.

No published studies were found that compared hand-held floss to mechanically held floss. One study¹² was completed by Porst, but it has not been published.

Kresch⁶ studied the "flossing habits" of patients using the hand-held vs. the mechanically held floss, but no attempt was made to compare efficacy between either type of flossing method.

A 1972 clinical study⁷ comparing three types of dental floss demonstrated unwaxed floss reduced gingival bleeding 74% while waxed floss reduced gingival bleeding 45%. The floss was manipulated daily by a dentist. In a later study⁸, when the patient manipulated the floss, the reduction in gingival bleeding was 76% for unwaxed floss and 60% for waxed floss. Another clinical study⁵, by Hill, Levi and Glickman, demonstrated waxed and unwaxed floss cleaned the proximal surfaces with very little difference. In a study utilizing

the electron microscope⁴ it was observed that waxed and unwaxed floss cleaned the teeth equally well.

It has been my clinical observation, as well as many others, that many people are unable or unwilling to successfully manipulate dental floss well enough to clean the interproximal surfaces. This may be due to their lack of digital dexterity or they may feel hand manipulation is too much trouble. Therefore, a mechanical floss holding device* was selected to compare with hand-held floss** to determine the relative effectiveness in cleaning, as well as patient acceptance of each method.

The primary objective of this study, then, was to evaluate the relative cleansing efficacy of a mechanical dental floss-holding device in comparison with hand-held dental floss.

As a secondary objective, the study sought to determine the patient acceptance of each of these methods of using dental floss.

Materials and Methods

The mechanical flosser selected was the EZ Dental-Flosser. This plastic instrument is commercially available and contains a replaceable cartridge of waxed dental floss. Adequate instructions accompany the device.

Johnson's small size, waxed dental floss was used as the standard for comparison, for two reasons. First, as indicated in the introduction, it is not unqualifiedly clear that unwaxed dental floss is more efficacious than its waxed counterpart in removing dental plaque, and, second, waxed dental floss was used in the mechanical flosser.

* EZ Denta-Flosser

** Johnson's Dental Floss Waxed

Subjects in this study were active duty or retired military members and their dependents who were chosen from among patients routinely processed through either Oral Diagnosis or the Oral Health Control Center at a large Army installation. A three-stage selection process was used. In stage one, the following three criteria had to be satisfied. First, there had to be a definite clinical need for oral prophylaxis; second, patients could not have routinely used dental floss more than once per week; and, third, they had to be able to return for a prophylaxis two weeks after the initial examination. In stage two, patients were examined by investigator #1 to ensure they possessed at least 20 contacting teeth and had no fixed prosthodontic devices. If these conditions were met, the investigator completed a Gingival Bleeding Index (GBI) as developed by Carter and Barnes³ but modified as follows: while in the original method unwaxed dental floss was passed through the interproximal areas using a double inciso-gingival motion and scored as either bleeding or no bleeding, the study method used floss with three vertical strokes in each interproximal area and a bleeding score was assigned based on a scale of zero to three. A score of zero indicated no bleeding; one, blood on the floss; two, blood oozing around the papilla; and, three, copious bleeding. Interproximal areas distal to the second molars were not scored nor were those between the maxillary and mandibular central incisors inasmuch as the patients were instructed to use both the hand-held floss and the mechanical flosser in the latter areas. Patients who successfully met the criteria established in stages 1 and 2 proceeded to stage 3 and were referred to investigator #2 who selected subjects for

the groups as follows: the first patient was chosen for either the control or treatment group by a statistically accepted random sampling method and the next patient was placed in the other group, and so on alternately. Patients would enter the treatment group only if they indicated they would like to participate in a scientific dental floss study and agreed to use the floss as prescribed by the investigator. Patients refusing to use dental floss were not placed in the control group since it was felt the controls should not have been aware they were to participate in a dental floss study.

The subjects were given explicit instructions regarding each of the treatment modalities, to include flossing the right/left side with the hand-held floss and the opposite side with the mechanical dental floss holder.

Investigator #2 decided, on a random basis, which side the subjects would use the hand-held and mechanically held floss.

The study was of two weeks duration, with the final modified GBI scores being taken on day 14.

Results

As described in the "Rationale" section, this study had two objectives. The first was to ascertain the relative cleansing efficacy of the mechanical floss-holding device and hand-held waxed dental floss. Patient acceptance of each of these two modalities was the second goal.

Four subjects in the experimental group and nine in the control group were not able to appear for their second examination; nevertheless, sufficient numbers of subjects in each group remained to allow a meaningful study. There were 36 in the treatment group and 31 in the

control group.

A paired-difference test^{9,10} was employed in analyzing the modified GBI data, rather than the Student's "t" test, because the samples were not independent. That is to say, each subject in the experimental group used the floss holder on one side of his dentition and the hand-held floss on the other. The paired-difference test evaluates the null hypothesis that the difference of the means of two dependent samples is equal to zero. It was found (Table I) there were statistically significant differences between the mean initial and final modified GBI scores for the hand-held and mechanical flossing groups. At the generally accepted confidence level, however, there was no difference between comparable scores in the control group. (Table I)

No statistically significant differences were found (Table II) when using the paired-difference test to compare the initial, less the final GBI scores between patients using the hand-held floss and those using the mechanical device.

Preference (Table III) responses indicated that 39 percent preferred the mechanical flosser, with the remainder equally divided between the hand-held floss and no preference. This is a four to three ratio in favor of the mechanical flosser. Or, another method of evaluating the responses is that of those subjects who expressed a preference, 56 percent opted for the mechanical flossing device; 44 percent, the hand-held dental floss.

Discussion

This study demonstrated there were statistically significant

improvements in the gingival bleeding scores of subjects in the treatment group; however, there was no statistical difference between the mechanical flossing device and the hand-held dental floss in reducing gingival bleeding. When comparisons were made between the control and treatment groups, the mean modified GBI scores decreased to a greater extent in the treatment group than those in the control. This also was statistically significant.

A questionnaire was given to the patients in the treatment group on day 14 and one of the questions was, "Since given the floss and instructions as a participant in this clinical study, did you use the floss daily, every day except one, about every other day, less than 1/2 of the time or you did not use it at all?" Of the 18 participants that answered this question, only five (5) said they used it daily. 13 used it less than daily. Of these 13, five used it less than 1/2 of the time. 4 patients complained of not being able to get the flosser in-between their posterior teeth and one could not get the flosser tight enough. 3 thought the flosser was easier to use. If this study were to be repeated, it would be better for the investigator to ask these questions and record the answers rather than have the patients do this for themselves. It would have been interesting and perhaps meaningful if we had known the use factor for each individual or group.

In 1976, Kresch⁶, reported only 24.8% of all patients returning for their six month recall and 30% of patients returning for their 3 month recall appointment used floss at least five times per week.

These patients were given regular floss** as well as a floss holder* and attended from 2-5 plaque control/oral health educational visits. This rather extensive training program was not sufficient to alter the habits of these randomly selected clinic patients to use floss daily. However, 21 of the 22 that did floss regularly preferred the mechanical flossing device.

Conclusion

Floss held by a mechanical device was as effective as regular hand-held floss in reducing gingival bleeding. The gingival bleeding of the non-flossing group remained unchanged. Patients that expressed a preference, preferred the mechanical flossing device by a ratio of four to three.

The authors thank LTC David Brunner, US Army Dental Corps and LT Robert Hatch, both formerly of US Army Institute of Dental Research and SP6 Wayne Radi for their support in this project.

This study was supported by the US Army Institute of Dental Research.

* EZ Denta Flosser

** Johnson's Dental Floss Waxed

Bibliography

1. Arnim, S.S. Thoughts concerning cause, pathogenesis, treatment and prevention of dental disease. J. Periodontology 29:217-223, 1958.
2. Bass, C.C. An effective method of personal oral hygiene. Journal Louisiana State Medical Society, 106:57-73 and pp 101-112, 1954.
3. Carter, H.G. and Barnes, G.P. The gingival bleeding index. J Periodont 45:801-5, Nov 1974.
4. Dewitt, K.B. and Brady, J.M. Evaluation of plaque debridement by scanning electron microscopy. IADR Abstracts, p 221, Mar 1972.
5. Hill, Levi and Glickman. Effect of waxed and unwaxed floss on plaque. IADR Abstracts, #693, Mar 1972.
6. Kresch, C.H. Finger-manipulated and floss-holder flossing: a comparison of the habit formation. Gen Dent 24:356, July-Aug 1976.
7. Medical Research and Development Command, U.S. Army Institute of Dental Research, Walter Reed Army Medical Center, Washington, D.C. Comparative effectiveness of three types of floss, stimudent, and water jet devices in reducing gingival bleeding. Reprint #21, 1 June 1972.
8. Medical Research and Development Command, U.S. Army Institute of Dental Research, Walter Reed Army Medical Center, Washington, D.C. Comparative effectiveness of floss, stimudent, and water jet devices in reducing gingival bleeding. (Patient Use) Reprint #25, 1 Oct 1972.
9. Mendenhall, William. Introduction to probability and statistics. 4th ed., page 460, North Scituate, Mass., Duxbury Press, 1975.
10. Naiman, Arnold; Rosenfeld, Robert; and Zirkel, Gene. Understanding statistics, page 235, New York, McGraw Hill, 1972.
11. Parmly, L.S. A practical guide to management of teeth comprising a discovery of the origin of caries for decay of the teeth with its prevention and cure. Philadelphia, Collins & Croft, 1819.
12. Porst, E.A. Major, United States Army Dental Corps, Fort Knox, KY. Personal communication, May 1972.

Military Disclaimer

Commercial materials and equipment are identified in this report to specify the investigative procedure. Such identification does not imply recommendation or endorsement, or that the materials and equipment are necessarily the best available for the purpose.

Furthermore, the opinions expressed herein are those of the authors and are not to be construed as those of the Army Medical Department.

TABLE I
Modified GBI Score Change Within The Treatment
And Control Groups

Group	Mean GBI Change	Significance Level
Mechanical Flosser	-.116	98%
Hand-Held Floss	-.151	99%
Control	-.047	94%

Table II
Modified GBI Scores Between
Subjects Using Study Devices

Group	Mean GBI Change	Significance Level
Mechanical vs. Hand-Held	.0358	82%

Table III

Patient Preference of Hand-Held
or Mechanically Held Floss

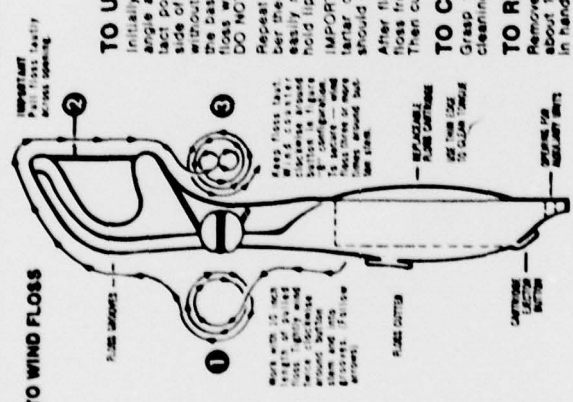
Preference	Number Selecting	%
Hand-Held	11	30.5
Mechanical	14	39
No Preference	11	30.5
Total	36	100

The illustration should have the following caption:

Handout given to study participants using floss.

Figure 1 was produced by Preventive Dentistry Products, Inc.

ez dental flosser



TO WIND FLOSS

1. Pull floss tightly across opening.

2. Floss cutter

3. Floss cartridge

4. Floss holder

5. Flosser handle

6. Flosser head

7. Flosser button

8. Flosser switch

9. Flosser lock

10. Flosser release

11. Flosser stop

12. Flosser end

13. Flosser tip

14. Flosser point

15. Flosser edge

16. Flosser surface

17. Flosser area

18. Flosser zone

19. Flosser field

20. Flosser range

21. Flosser span

22. Flosser width

23. Flosser height

24. Flosser depth

25. Flosser length

26. Flosser volume

27. Flosser mass

28. Flosser weight

29. Flosser density

30. Flosser pressure

31. Flosser force

32. Flosser torque

33. Flosser power

34. Flosser energy

35. Flosser work

36. Flosser heat

37. Flosser light

38. Flosser sound

39. Flosser smell

40. Flosser taste

41. Flosser touch

42. Flosser feel

43. Flosser look

44. Flosser sound

45. Flosser smell

46. Flosser taste

47. Flosser touch

48. Flosser feel

49. Flosser look

50. Flosser sound

TO USE FLOSSER

Initially use a mirror. Start with the lower front teeth. Place floss at a 45 degree angle and with a slow back and forth motion slide the floss below the contact point between adjacent teeth. Move floss firmly up and down on the side of one tooth and then repeat on the side of the other tooth. Each time without hurting yourself, go to just below the gum line into the crevice at the base of each tooth. CAUTION: Do not force floss into the gums. Remove floss with the same back and forth motion up through the point of contact. DO NOT PULL FLOSS OUT!

Repeat this flossing procedure in all the spaces between the teeth. Remember there are two sides to be flossed on each tooth. NOTE: Buckle molars are easily reached from mouth corners using the curved side of the handle to hold lips.

IMPORTANT: Any tooth areas that cause the floss to shred may indicate tartar deposits, cavities, overhanging fillings or other problems and you should consult your dentist.

After flossing all teeth, unwind floss and pull about three inches of fresh floss from cartridge and rewind by following TO WIND FLOSSER directions. Then cut off excess used floss with FLOSS CUTTER.

TO CLEAN TONGUE:

Grasp flossing head and use outer, narrow edge of floss cartridge for cleaning tongue surface.

TO REMOVE AND REPLACE FLOSS CARTRIDGE:

Remove empty floss cartridge by pressing in on ejector button. Pull out about 10 inches of floss from new cartridge. Thread floss up through hole in handle cavity, then snap new cartridge into place in handle.

PREVENTIVE DENTISTRY PRODUCTS, INC.
P.O. Box 754 Corona del Mar, California 92625
U.S. Patent Pending and other foreign countries.
Copyright © 1972 Preventive Dentistry Products, Inc.